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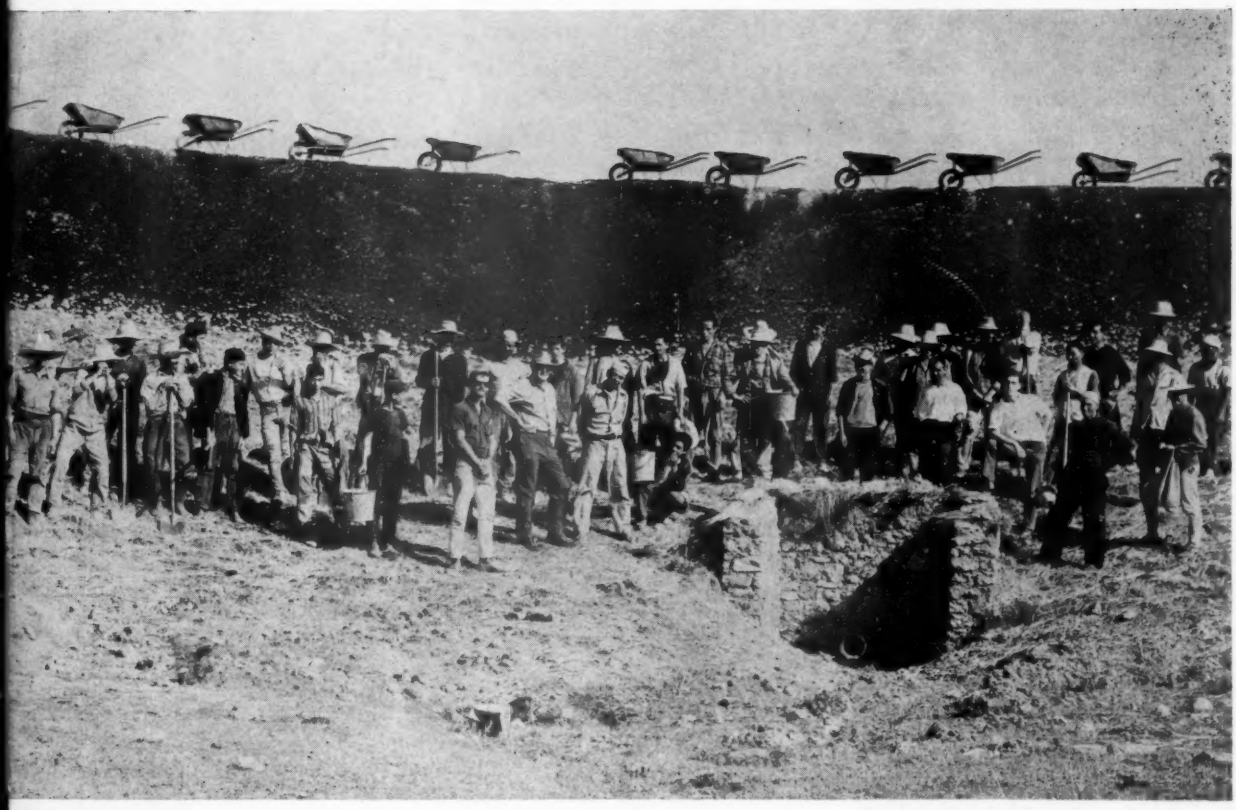
soil conservation

DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES



INTERNATIONAL AID IN CONSERVATION

Nigeria Tunisia Algeria Nicaragua Thailand

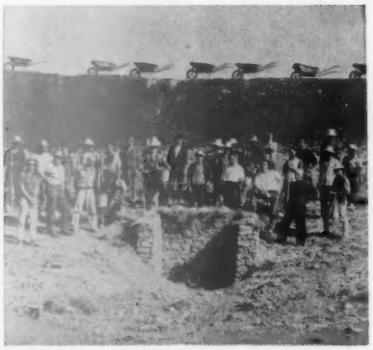
A Hundred Watershed Dams

Outdoor Laboratory for Teaching

SOIL CONSERVATION SERVICE

U. S. DEPARTMENT OF AGRICULTURE

August 1967 Vol. 33, No. 1



COVER: Algerian workmen line up with their tools on the job at the Hausonvillers Dam. Story on page 6.

soil conservation

DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES

3 **Soil Conservation Team in Nigeria**
By Armin R. Grunewald

6 **Un sejour en Algerie**
By Elvin V. Wickline

9 **New Grasses Tested in Nicaragua to Increase Livestock Feed**
By Gerald M. Darby

10 **Training for Visitors From Other Countries**
By J. B. Rogers

12 **Unruly Chambers Creek Is Being Subdued**

15 **Outdoor Laboratory Adds Real Life to Study of Biological Sciences**

17 **Soil Survey for Planning Body Guides Zoning and Building**
By Harry M. Major and Robert E. Fox

21 **Review**
Attracting Birds: From the Prairies to the Atlantic; Plant Environment and Efficient Water Use; New Publications

23 **From the Administrator**
Soil, Water, and Food for Peace

24 **The Crider Memorial Garden of Conservation Plants**

Reports From the Field
5 Thailand farm. 14 Terraces in Tunisia.

Of Current Interest
18 National water assessment. 19 USDA conservation policies.
19 Soil, water, and suburbia.

Horizons . . .

We begin the 33d volume of *Soil Conservation* with an issue that aptly reflects the ever-expanding horizons of the Soil Conservation Service.

Our operations in other lands—intended to help people become self-sufficient through wise use of their land and water resources—are in sharp contrast to our initial mission a generation ago of erosion control on a few demonstration areas in the United States.

The expansion has not been limited to geographic horizons. From a primary preoccupation with soil erosion, our concern has grown to embrace the total complex of soil-related resources—the land as a whole, including water and the plant and animal life that support mankind.

The new logotype on our cover this month is designed to symbolize this shift in emphasis from *soil* alone to total *conservation*.

Vigor: The vigor of a fresh new interest shows in the response of fieldmen to our invitation to report on their foreign assignments.

Armin Grunewald's account (p. 3) of the Northern Nigeria project reveals the effective working arrangement SCS has with agencies of USDA, the State Department, and the government of each participating Nation.

And Elvin Wickline's personal story of his sojourn in Algeria (p. 6) mirrors the personal satisfaction that comes from carrying out a challenging assignment.

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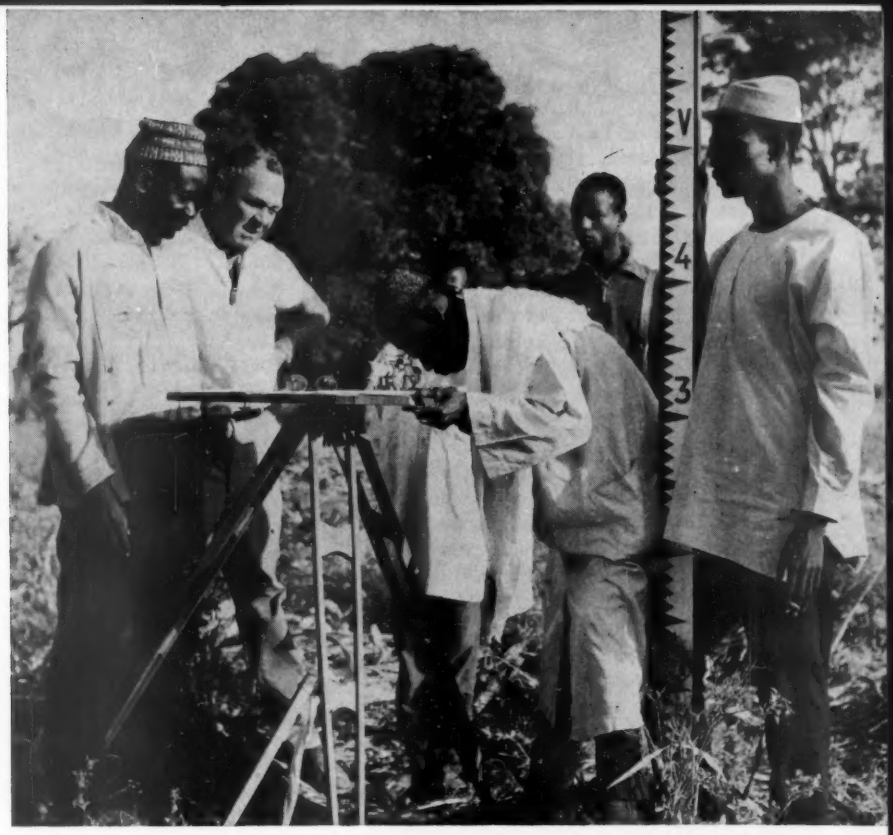


Mallam Mustapha Kano (left), agricultural superintendent, and Ellis Baker, SCS soil conservation engineer, assist a group of agricultural assistants with a topographic survey at Dankanjiba, Katsina Province.

By Armin R. Grunewald
SCS team leader, Katsina, Northern Nigeria

SCS Conservation Team in Nigeria

The Soil Conservation Service is helping the Nigerian Government with technical supervision of three major conservation endeavors: (1) Training a resident staff of conservationists, (2) developing a technical guide of conservation methods, and (3) planning and applying conservation work in project areas.

In August 1965, a four-man team arrived in Northern Nigeria under terms of an agreement with USDA's International Agricultural Development Service (IADS), the Agency for International Development (AID), and the Nigerian Government. I, as team leader, and E. M. Baker, soil conservation engineer, are posted at Katsina. M. E. Saffry, soil conservationist, and W. L. Shelton, soil scientist, are at Mubi.

There is a desperate need for expansion of soil and water conservation over wide areas in Northern Nigeria. Excessive and untimely tillage, improper use of implements, removal of crop residues, burning, overgrazing by livestock, and cultivating land not suited to farm crops have contributed to widespread erosion. Soil and water losses are progressively affecting larger areas.

The training program

Training is the fundamental contribution being made in close cooperation with the Ministry of Agriculture staff. An immediate need is to build a specialized staff concerned solely with soil and water conservation activities.

Nigerian counterparts are assisting the SCS team at the training locations. These men are "returned participants" from the USAID Participant Training Program in the United States, and they have had field experience in soil conservation.

Agricultural assistants and agricultural instructors are in training at Katsina and Mubi. Training has expanded to a third location, Jos in Plateau Province.

The training consists of classroom instruction on basic fundamentals and on-the-job training to apply conservation measures and practices to the farmers' lands. Forty-one agricultural specialists have completed their classroom study and are posted to field project areas in six provinces.

Additional staff will be assigned to the soil conservation training program when they have completed their education at the School of Agriculture or at the Farm Institute Centers. Some agricultural in-

structors will be recruited locally from the secondary schools.

The second objective—development of a technical guide—is progressing satisfactorily. The guide includes standards and specifications for soil conservation practices economically and technically applicable to localized conditions for selected sites in Northern Nigeria. As work experience is gained, the guide will be expanded to cover larger areas.

Technical guide

The technical guide combines knowledge from the fields of engineering, agronomy, and soil science. Research material published by the Institute of Agricultural Research at Samaru has been very helpful. Existing soil survey information is being used with full recognition that the information is incomplete.

The project areas where soil and water conservation work is being done were selected on the basis of need for conservation, the training potential, demonstration value, and the degrees of interest expressed by local farmers. The final selections were made after general reconnaissance and discussion with the farmers, village and district heads, Native Authority staff, and the Ministry of Agriculture.

Project areas and the demonstrations will be used to show alternative methods that can be applied to the land. They will show the beneficial effects that can be expected from sound soil and water conservation. Future work is expected to spread from these nucleus areas.

At the request of the Ministry of Agriculture, the SCS team and the Nigerian soil conservation staff are assisting with planning and giving technical guidance to the resettlement of 50,000 farm people on new farmland in the Kainji Dam watershed. The areas are being selected, as much as possible, on the basis of a semidetailed reconnaissance soil survey. The work is being carried on in cooperation with the Niger Dams Authority Resettlement Scheme.

Work on the land

The Katsina team is concentrating its efforts at Kadandani, Dankanjiba, and Daudawa in Katsina Province. Shelterbelt work to give protection against wind erosion is continuing at three locations in the Northern Sudan vegetative zone.

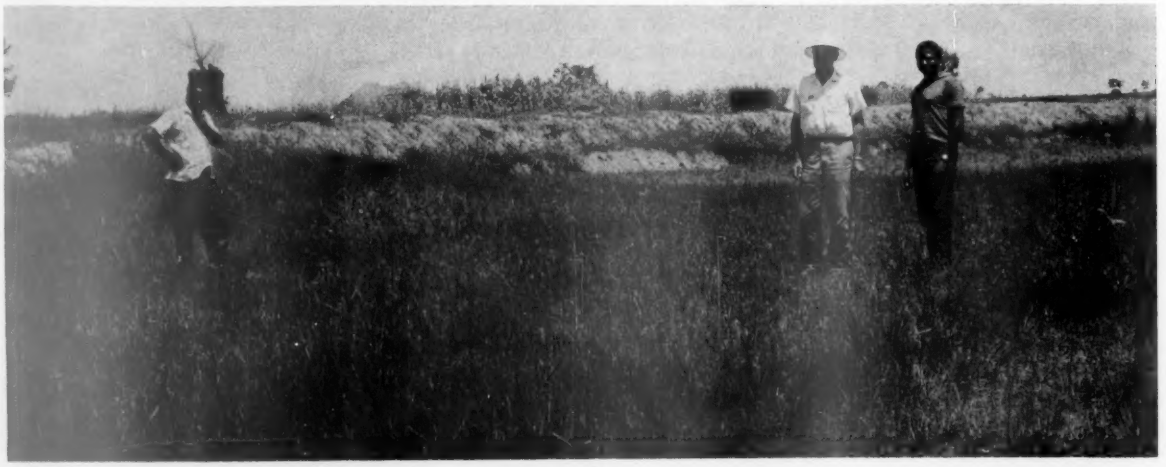
The work at Kandandani is a continuation of work started earlier. Good conservation was applied, but it was limited in nature and scope. Lack of understanding by the farmers and lack of a trained conservation staff contributed to maintenance problems. The crews are busy rebuilding contour bunds, improving contour ridging, and renovating watercourses.

New work includes construction of diversion channels above the cultivated land to divert runoff water from bushland. Watercourses are being constructed. Active gully erosion is being arrested by two grade-stabilization structures, a drop spillway, and a chute spillway. Channel improvement and vegetative measures are applied below the structures.

A fadama (bottom land) survey is being made to determine the best method to improve this land for productive farming during both the rainy and dry seasons.

At Dankanjiba severe bank and gully erosion is encroaching into some of the best land in Katsina Province. Drainage channels are needed to control the movement of surface water. The work will include diversions, watercourses, two grade-stabilization structures, small check dams, and sloping of the eroded banks. Seeding and planting permanent vegetation in critical areas is an important part of the program. Permanent protection against human and animal trespassing is necessary.

Milton Saffry, SCS soil conservationist, and agricultural assistants inspect a newly shaped and seeded watercourse at Pankshin.



Agricultural instructor trainees watch Bill Shelton, SCS soil scientist, check soil depth on a proposed demonstration site in Maiha District, Sardauna Province.

The work at Daudawa includes water-control measures to protect cultivated land from encroaching gully erosion. Better farming methods, increased fertilization, conservation crop sequences, and crop residue management are included in the conservation program.

The Mubi team is concentrating its efforts at the Gwoza Resettlement Scheme, at Lamurde and Michika in Sardauna Province, and at two areas in Plateau Province.

The work at Gwoza Resettlement Scheme includes road drainage and stabilization, bank levee and channel improvement on Hambagda River to divert floodwaters, and the revegetation of the catchment area by planting trees.

The work at Lamurde includes terrace systems, watercourses, contour ridging, channel improvement, and a grade stabilization structure. A cooperative drainage channel is being constructed by farmers.

The Michika water-control and fish pond project includes an earth dam and a 400-foot long spillway. A 40-foot weir, 7-foot drop masonry structure is constructed at the end of the spillway.

At Mayo Bani excavation is complete on 400 feet of a 12,000-foot drainage channel. This channel will improve the drainage for 1,200 acres of productive cropland.

In Plateau Province the team is concentrating on the training program. The group is doing fieldwork at Pankshin and Miango. The work includes watercourse construction and related practices.

The major portion of the work at all projects is done by hand, hoe, and head pan. Small tractors with scraper blades and scoops are used where available.

The SCS team has suggested that farmers share costs in the application of conservation practices on their land. Farm labor is used, and workers are paid 5 shillings a day (70 cents). In two areas, farmers agreed to work for 3 shillings a day, donating the rest of their labor. ♦

Thailand farm is dream come true

A Thai farmer, Nai Sawat Tamata, now has a profitable and productive farm, thanks to technical aid provided by the Soil Conservation Service through an agreement with AID and the Government of Thailand.

It's a pleasant sight and a dream come true for Nai Sawat. The slope of his farm of 45 rai (about 18 acres) in Amphur Chiengkarn District of Changwad Loei Province is broken with contour terraces, and curving rows of healthy cotton plants sweep gracefully out of sight around the bend. Near the foot of the slope, a banana orchard produces fruit and shade and protects the farm buildings. Below, a small stream shimmers in the sun, and Nai Sawat can already see in his mind's eye the off-stream fish pond he plans to build there.

A year ago much of the land was scrub forest and the Tamatas realized only a bare existence from it. Their bananas brought them 900 baht (about 45 dollars) a year. In 1966, the cotton, sesame, peanuts, and vegetables were sold for approximately $1,050, and the green manure from the crops was extra.

This didn't happen just by chance. Planning and hard work by Nai Sawat, assisted by the Chiengkarn Work Unit of the Department of Land Development, made the improvement possible.

Khun Seri, the work unit leader, and Nai Tamata together prepared the conservation plan. With bulldozers and hand labor, they cleared the land; with tractor and buffalo, they plowed it and built the contour terraces. And now Nai Sawat is laying plans for the fish pond.—CLYDE T. LOWE, *soil conservation adviser, SCS, Thailand.* ♦

Un sejour en Algerie

By Elvin V. Wickline
Project conservationist, SCS, Tizi Ouzou, Algeria (soil conservationist, Princeton, W. Va.)

The town of Bou Assem, in the immediate work area of the first project in the Grand Kabylie, was served by a single water fountain.

"..... go to Algeria with a Soil Conservation Service team and help plan and supervise the operation of soil and water conservation projects that will provide employment, apply soil and water conservation practices on eroding land, and in so doing teach Algerian counterpart technicians modern conservation techniques."

This was the essence of an offer and the job description presented to me July 1963 by the Soil Conservation Service. I accepted and was assigned as project conservationist at Tizi Ouzou in the Grand Kabylie of Algeria.

A very busy 3½ months followed, involving language training, security clearances, orientation, passports, physical examinations, immunizations, school arrangements for the children, selling a house, orienting a replacement, storing furniture and personal goods, and packing the rest for shipment. It hardly seems possible that we got it all done, but we did, and on October 28 we boarded a plane at Kennedy International Airport in New York for the first leg of the journey.

New experiences

Ahead lay a whole new set of experiences. There would be problems, disappointments, inconveniences, frustrations, dangers, and downright hardships. We had promised ourselves all these when we accepted the job. But, there would also be many delightful and rewarding experiences . . . the challenge of a new job . . . a different language . . . a new culture . . . new people . . . and the living in a foreign land.

Now it was all beginning to unfold.

We stopped for 3 days in France to get the children settled into boarding school. Early on the first day of November, my wife and I, both a bit apprehensive at leaving the children in a strange land and a new school, boarded a plane at Orley Airport for the 2½ hours' flight to Algiers.

All but one of the Soil Conservation Service technicians assigned to the Algerian program had arrived earlier. Charles Hood, program conservationist, and his wife, Pauline, met us at the airport.

Charlie proceeded to perform a near miracle by loading four adults and 11 pieces of luggage in his Volkswagon for the 10-mile ride into Algiers. There we met the other members of the SCS team and their wives . . . people with whom we would associate very closely during our stay in Algeria . . . people whom we would come to know and love very much.

The Grand Kabylie team

The American technical team in the Grand Kabylie was stationed at Tizi Ouzou, a town of about 60,000 people, 60 miles east of Algiers. I was project conservationist, and the other member was Charles L. Walter, conservation engineer, from Montana, who arrived about the first of March 1964. Although he was assigned to the program conservationist's staff, he and his family lived in Tizi Ouzou. Two-thirds of Walter's time was spent with the Tizi Ouzou unit.

Eight very capable young Inter-

national Volunteer Service (IVS) technicians were assigned as junior technicians to supervise the projects. Four of these young men helped begin the work in the Kabylie. They were Shirland Sloane from Illinois; David Strong, Connecticut; Jon Wilda, Pennsylvania; and Warren Palmer, Florida.

About 9 months later as the workload built up, four additional IVS technicians arrived on the project. They were David Barrett, New York; Vernon Carlson, Washington; David Johnson, Illinois; and Larry Clough, Kansas. All the IVS technicians attended SCS training sessions at Fort Robinson, Nebr., before going to Algeria.

Ramdane Zendejebil, of Tizi Ouzou, was employed as an interpreter.

There were two other teams in Algeria. One was located at Tlemcen near the Moroccan border and headed by Project Conservationist Frank Carr, SCS, of Virginia. The other was stationed at Orleansville, about 120 miles west of Algiers, and was headed by Project Conservationist Tom Dicken, SCS, Kansas. All three teams were under the supervision of Program Conservationist Charles Hood, SCS, Missouri, who was stationed in Algiers.

"Food for Work"

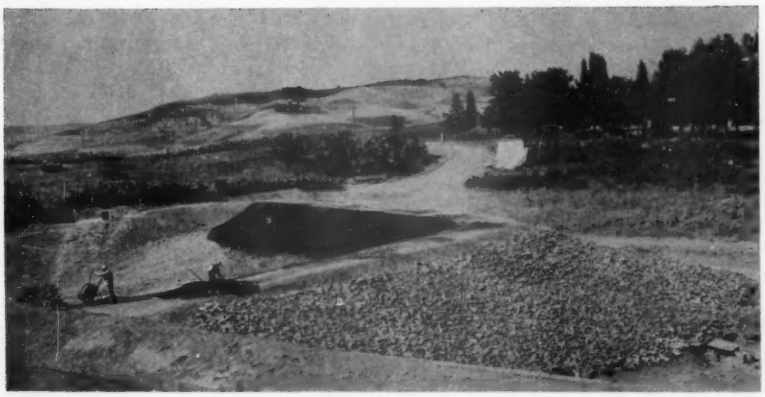
The "Food for Work" program in Algeria was a technical aid agreement between the Soil Conservation Service, the Agency for International Development, and the Government of Algeria. The aim was threefold: (1) Install soil and water conservation practices on eroding argicultural land, (2) provide employment to Algerians by utilizing hand labor, and (3) teach Algerian counterpart technicians soil and water conservation methods as used in the United States.

The United States furnished technicians to supervise the work and teach the counterpart technicians; it provided the tools, equipment, and vehicles; and it paid about half the daily wage of the workers in the form of wheat and vegetable oil. The Government of Algeria provided management of the labor force and the cash portion of the daily wage, which amounted to about $1 per worker. Counterpart technicians were never assigned by the Government of Algeria. Work projects were set up near areas of high unemployment so the workers could live at home.

The Grand Kabylie is a densely populated mountainous area in north central Algeria, bordered on the north by the Mediterranean Sea and on the south by the Saharran Atlas Mountains. The climate is typically Mediterranean, with wet winters and hot dry summers. Snow is common in the higher elevations during winter, but in the lower areas the ground never freezes and rarely receives any snow.

Berber customs

A high percentage of the people in the Kabylie are Berbers, who cling to their ancestral customs. Small towns are located on the high mountain peaks and ridges overlooking the surrounding areas as a defensive measure against invading tribes. It is said that a true democracy was practiced in these villages—the winner in an election was declared the mayor



Women wait their turn (above) to carry water from the fountain on the edge of the town of Tazbit. The earth dam at Hausonvillers (below) was built with hand labor. The dark material on the downstream face is refuse from a winery being used as a mulch.

and the losing candidate became the treasurer.

The French occupied Algeria for 138 years and left a strong influence on the culture of the country. French, Arabic, and Kabylie languages are used. Most of the newspapers are in French. Arabic is spoken extensively in the larger urban areas, but in the moutain towns and villages Kabylie, which is an unwritten language, is used extensively. Less than 15 percent of the population can read and write—in any language.

Most of the large farms in the Kabylie, formerly French estates, are now owned by the Algerian Government and are operated by a committee of the workers. The vast number of family farms in the Kabylie are small and are getting smaller as they pass from father to sons.

The principal crops are figs, olives, grapes, oranges, cork, wheat, grain, sorghum, chick peas, melons, and a wide variety of vegetables. Untold thousands of sheep, cattle, goats, and donkeys are raised in the area. The animals are taken out to graze early in the morning and are brought back to the homestead at night.

Although many of the farms, particularly the larger ones, have modern machinery, wooden plows drawn by oxen are common on the small farms. Much of the wheat is threshed by hand, even on the large farms.

Serious erosion

Soil erosion is serious and widespread in the Kabylie on both the large and small farms. By and large, little has been done in the way of effective conservation farming. A few of the French farmers had terraced steep land and practiced "culture en bande" (striperopping). Most of the conservation effort by the Government involved reforestation. A few projects utilizing huge terraces, called "banquettes," had been established on open land.

Nothing has ever been done to improve pasture or range conditions or in any way develop a forage program. Overgrazing is of unbelievable severity. During the extremely dry periods the leafy branches of the fren (ash) tree are fed to the livestock.

West of Constantine and north of the high plains, in the Atlas Tell, is the watershed of Djemila. Here, French archeologists unearthed the Roman city of Cuicul, which had been buried for centuries.

The Romans prospered in the area for some 600 years, but they fled in the 7th century in the face of invading nomads. The land then began to decline under the onslaught of overcropping and overgrazing. Torrential winter rains tore the soil loose from the unprotected hillsides and carried it down the slopes. Slowly but surely Cuicul was buried.

The large Roman city at Timgad, some 70 miles to the southeast, also lay buried for centuries under deposits of wind-blown soil until it was unearthed shortly after 1900.

Today, a large percentage of Algeria is much like the areas surrounding Djemila and Timgad. The hills and mountainsides throughout the country are eroding rapidly, and unless something is done quickly the country's soil resources will be limited to the relatively small acreage of flatland.

The area selected for our first project was some 3 kilometers south of the commune headquarters at Hausonvillers between two smaller towns, Bou Assem and Tazbit. Overcropping and overgrazing had deteriorated the cropland to the point that gullies from 6 to 18 inches deep were frequent. Waterways were raw ugly gulches 10 to 12 feet deep. "Soil conservation" there consisted of cultivating around the ever-enlarging gullies!

Some 4,000 people lived in Bou Assem, Tazbit, and the immediate work area. Hausonvillers, 3 kilometers to the north, had another 5,000 people. There was little or no employment in the area, and labor was plentiful, even though many of the young men had gone to France to work.

Need for water

All three towns had woefully inadequate water systems. Bou Assem and Tazbit each had a single water fountain supplied by a small open-ended pipe that delivered about 9 gallons a minute during the spring and about half that during the dry season. These two fountains were the domestic water supply for more than 3,000 people!

The village women and children stood in line at the fountain to fill their jugs and buckets. The family clothing was laundered in the nearby stream or at the fountain. There were no provisions for the disposal of human wastes in either town. Both towns had new school houses with modern plumbing installed, but there was little water and less money, and the plumbing was never connected. These problems weren't unique to these towns; everywhere we went we were confronted with almost identical conditions.

In cooperation with Algerian technicians, local citizens, the mayor, and the *sous-prefet*, a conservation plan was developed to do something about the serious soil erosion and water shortages. All the cropland would be terraced and cultivated on the contour. Fruit trees, olives, and figs would be

(Continued on p. 20)

Correction

The last paragraph on page 243 of June *Soil Conservation*, in the article, "World Potentials of Arable Soils," by Charles E. Kellogg, should read: "North America and Central (not South) America together could increase arable soils by about 660 million acres or a bit more."

New grasses tested in Nicaragua to increase feed for livestock

By Gerald M. Darby
Agronomist, SCS, Managua, Nicaragua

In a search for better forage species to increase beef and dairy production in Nicaragua, approximately 75 introduced and locally collected grasses and legumes are being evaluated at the National Research Station near Managua and at field locations.

Assistance in this work, and in general pasture and livestock development, is being provided by the Soil Conservation Service by assignment of a resident agronomist (the author) as a part of a USDA team sponsored and supported by the U.S. Agency for International Development.

Those doing this work have several objectives in mind. One is to find high-producing, easily established grasses that are more palatable than Jaragua *(Hyparrhènia rufa)* and Guinea grass *(Panicum maximum)*, the grasses now most commonly used in Nicaragua.

The Soil Conservation Service's National Plant Materials Center at Beltsville, Md., provided seed of 38 varieties of legumes and 12 varieties of grasses for the testing being done at the Nicaraguan National Research Center. These species were collected in tropical areas around the world.

Three strains of buffelgrass *(Cenchrus ciliaris)* and one strain of Guinea grass show promise. All four of these grasses are high producers, prolific seeders, have seedling vigor, and are leafy and fine stemmed. The latter two characteristics appear to enhance their palatability.

A group of technicians and administrators review results of grass and legume trials at the National Research Center, Managua, Nicaragua. U. S. personnel are Carl Koone (second from left), rural development chief, USAID; Dr. J. L. Paschal (fourth from left), PASA team leader; and the author (sixth from left).

Buffelgrass and Guinea grass originated in Africa, as did many of the useful tropical pasture grasses. Two of the buffelgrass strains were selected and evaluated at SCS plant materials centers in the United States: one in Florida and one in Texas. Another was selected in Southern Rhodesia. The Florida strain has shown slightly more overall adaptability in Nicaragua than have the other two.

A strain of Guinea grass was selected in El Salvador. It still remains to be seen if all these grasses will survive the 6 months' period from December 1 to June 1 when there is no rain.

For wet soils

Another objective of the plant material search is to find grasses that will do well on a poorly drained, heavy clay soil which covers extensive areas in Nicaragua. Much of this soil is saturated with water for long periods during the rainy season but is dry and cracked during the rest of the year.

German grass *(Echinochloa polystachya)* does well on inundated soils, but its survival during the 6 months of drought has not yet been tested. Two other grasses that show promise are Pretoria 90 *(Dicanthium annulatum)* and Gordo bluestem *(Dicanthium aristatum)*. The former is an excellent producer but is a poor seeder. Gordo bluestem is only moderately productive but is a very prolific seeder. How well these grasses survive during the dry season remains to be seen.

Another important need is to find perennial legumes that are compatible with the pasture grasses. Tropical kudzu *(Pueraria phaseoloides)* looks promising. There are, however, good mixtures of native legumes and Jaragua grass in well-managed Nicaraguan pastures. Collection and propagation of native spcies of *Desmodium, Centrosema, Calapogonium,* and *Clitoria* seem to offer the most promise. ♦

Training for Visitors From Other Countries

By J. B. Rogers
Foreign training officer, SCS

The Soil Conservation Service has for many years been sharing its technical information and knowledge on soil and water conservation with visitors from other countries. Emphasis has been given to helping technicians from the developing countries, but many from the so-called developed or advanced countries have also sought our advice and assistance.

During the last 10 years, SCS has assisted 3,526 visitors from 98 countries. They spent 52,272 man-days with SCS employees, spending anywhere from 1 day to several weeks primarily at field offices where techniques and procedures were observed and practiced.

Most of the trainees coming to SCS are sponsored by the Agency for International Development (AID). Responsibility for coordinating training assignments among USDA agencies, for preparing programs, and for looking after the needs of the participants rests with the International Agricultural Development Service (IADS). SCS cooperates with IADS by assisting with program planning and by accepting responsibility for training in various aspects of soil and water conservation.

The expenses of AID-sponsored participants in this country are paid by the U. S. Government as a part of our foreign aid program. SCS is also reimbursed by AID for actual expense involved in training their participants.

While AID is the principal source of participants assigned to SCS, many come on their own or on behalf of their government, as fellows supported by FAO or other United Nations organizations, or by private foundations.

During 1966, AID sponsored 359 participants, FAO 20, private foundations and organizations 6, and home governments or self 83, making a total of 468 in all.

Trainees assigned to SCS are of four groups: students, experienced technicians, farmers, and administrators.

Many young people are brought to this country for both undergraduate and graduate work in soil and water conservation and such subjects as soils, range management, irrigation engineering, and watershed management. SCS assists the IADS program specialists with the selection of appropriate universities and usually provides opportunities for practical experience in the field during the summer vacation or after completion of the academic training.

Experienced technicians are people who have been working on the job in their home country. They come to this country to see and to learn new skills and often to update their academic training with or without obtaining a degree. SCS shows them how to work directly with individual farmers and local groups and has them work with experienced personnel to acquire skills in planning, designing, and establishing soil and water conservation practices.

Many farmers come to this country, both by themselves and in groups. For example, during the past 2 years 10 groups of landowners and farmers have come to this country from Argentina to observe our techniques and procedures in all areas of agriculture. All 10 groups expressed a real interest in conservation work. The programs were not just explained to them but also demonstrated by visits to farms and ranches. These farmers are influential men and women in their own countries and can do a lot to initiate and support programs of their own.

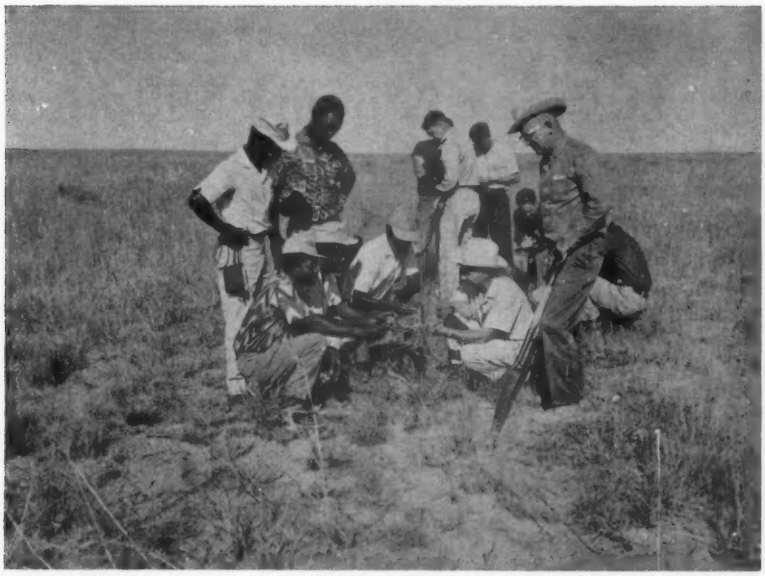
Each year a few high level administrators visit SCS to study the way our work is organized, planned, and administered. They usually spend time in our Washington, State, area, and work unit offices to observe the functions and operation at each level. This, too, is an important part of the foreign training program, since line and staff people have a difficult time adapting and using the principles they have learned if they do not have support from the top administrators of their organization.

The kinds of training provided vary with the needs of the participants.

Academic training at a university (basic or refresher) is often needed so the participant can grasp the scientific principles and understand the technical language used by our professional employees.

Practical field training is provided for those who will return to specialist type positions where they are "doing a job." They learn to do the work by actually practicing the techniques and procedures.

Special short courses have been designed for foreign visitors at our San Luis Obispo training center. They cover all aspects of soil and water conservation, including farm, ranch, and watershed planning, and elements of communication and management. Where possible this work is included at the start of participant programs to lay the groundwork for later field experience.



Five foreign trainees from Ghana, Africa (left), examine root system of sand bluestem plant on a farm in Gill, Colo., with the help of SCS Conservationists Willard Graves and Tom Famon. Trainees from Africa (right) with SCS Soil Scientist Kenneth Good extract soil profile on a farm in Otoe County, Nebr.

Short courses have also been given in soil conservation by Oklahoma State University and by the Soil Conservation Service in Puerto Rico, in irrigation principles and practices by Utah State University, and in range management by Colorado State University.

Observational training is provided for those individuals who have limited time available. They are usually farmers, administrators, or scientists, who have specific objectives and want to get the broad picture or see specific practices.

Most foreign training programs include a mixture of the above kinds of training. They may also involve assignments with other agencies and with universities as well as with the Soil Conservation Service.

In addition to learning technical skills, participants also see how things are accomplished through local leaders and organizations, such as soil conservation districts, and how local, State, and Federal agencies work together.

In the training process, they get to know Americans. American customs, and American traditions by visiting American families, churches, service clubs, farm organizations, and others

Training results can be evaluated in several ways. The reaction of the participant himself, either formal or informal, is the most common.

IADS conducts terminal interviews with participants. These interviews are aimed at determining the general reaction of participants to their programs and have resulted in many improvements in the techniques used to plan for and work with them.

Each program now carries suggestions for followup with the participant immediately after returning home, 3 months after return, and 1 year after return. The local sponsoring agency representative keeps in touch with the participants regarding their work, the opportunity they have had to use their training, and their significant accomplishments. AID conducts evaluations both in this country and in the home country.

The final proof of the value of training is in accomplishments in the home country following the training. Many countries have established their own conservation programs. India and Turkey are good examples. Returned participants, AID consultants, and SCS technicians, including the administrator of SCS, have all worked together to get conservation moving in these two countries.

Other countries with active soil and water conservation programs established with advice and help from this country are: Taiwan, Korea, Pakistan, Venezuela, Columbia, Brazil, South Africa, Rhodesia, Kenya, Nigeria, Tunisia, Thailand, New Zealand, and Israel. Many others are starting programs in local areas or incorporating some aspects of soil and water conservation in other programs.

The SCS anticipates a continuing need for training technicians from developing countries. We recognize that foreign training responsibilities are an important part of our job. SCS has a real opportunity to demonstrate the planning, organizing, assigning of responsibility, and scheduling it takes to get things done. ♦

A hundred dams in one watershed . . . .

Unruly Chambers Creek Is Being Subdued

The 100th flood-prevention dam in a single upstream Texas watershed project is now being built.

The record-setting dam is in Chambers Creek in central Texas, where flooding has been prevalent as long as old timers can remember.

But you don't install 100 dams on a 77-mile long creek overnight. In fact, it has taken Chambers Creek sponsors 12 years, and the job is just two-thirds complete. But the creek is losing its punch—the 1966 rains proved that.

A weeklong rain of 8 to 10 inches swamped Chambers Creek, a tributary of the Trinity River, in early May last year. Flooding was severe in unprotected parts of the watershed, but the creek stayed in its channel where the dams were built.

"The dam above us saved the day," James Henderson says of his farm on Onion Creek where most of the dams are built. "The water stayed in the creek. We didn't lose a fence, and our creek bottom field didn't flood. One year, before the dam was built, I lost seven bales of cotton from that same kind of rain."

"Our creek ran about three-fourths full," Clyde Garner says of Mill Creek. "If it hadn't been for those flood-prevention dams, the entire bottom would have been flooded."

H. A. Martin's 225-acre farm is just over the hill from Onion and Mill creeks on a section of Chambers Creek where few of the needed dams were in place in 1966. He told a different story.

Martin said the flood cost him about $7,000. He lost 11 cows, his crops, and his fences.

SCS engineers estimate the project saved $233,000 in that one rain but would have save $490,000

Below a series of floodwater-retarding structures, a controlled stream of water (above) flows calmly within the banks of a tributary of Chambers Creek after a 10-inch rain. Before the watershed project was started, floods were so frequent that the highway department had special signs made to warn motorists (upper right). The tops of the posts (middle right) mark the edge of the highway bridge on Chambers Creek before the dams were built. Shading on the map shows areas above the dams and flood plains protected by them.

if the project had been completed.

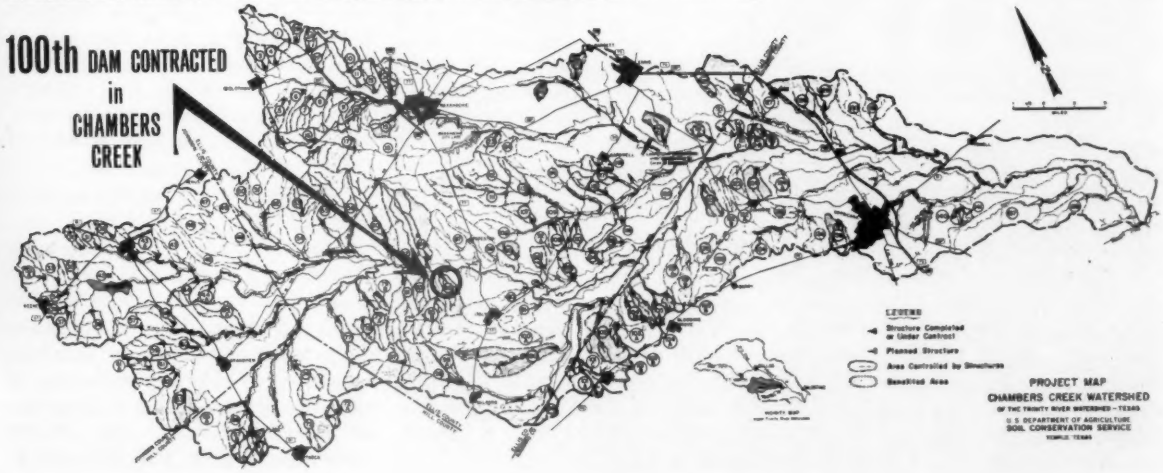
The 100th dam on Chambers Creek is a tribute to the project's frontline, local-level leadership. Four soil and water conservation districts, four county commissioners' courts, and one city sponsor the project.

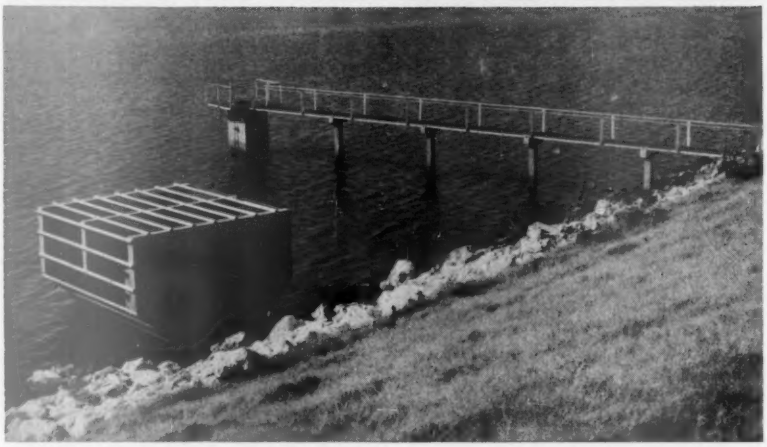
In the early 1950's, these local interests asked the Soil Conservation Service to help them plan and install a system of land-treatment and flood-prevention measures that would tame the unruly creek.

By 1955, the SCS and the sponsors had hammered out a plan for the 686,000-acre watershed. In addition to terracing, grassed waterways, soil-building crops, and other conservation work, the plan called for 150 flood-prevention dams and 79 miles of channel improvement.

The city of Alvarado has helped in the project because its citizens wanted provisions for water supply built into a flood-prevention dam. The 500-acre lake is now furnishing badly needed water and recreation for the city.

The 100th dam is in the Ellis-Prairie Soil and Water Conservation District on land owned by Mrs. Alta Edmondson and W. D. Campbell. It is in the same conservation district where the first dam was built in 1955. And the Ellis County Commissioner's Court





The city of Alvarado built a boat ramp (upper) on one of the multiple-purpose structures which also includes storage for 4,000 acre-feet of municipal water supply. The control valves are seen back of the spillway inlet in the lower picture.

was the first to pledge all-out help to the districts in getting the project started.

"We are pleased with the overall progress in Chambers Creek," says Weldon Blair, chairman of the Ellis-Prairie District board of supervisors. "Our success so far has been the result of help from the people; however, we'll need more help before it's completed."

"The Ellis County Commissioners' Court knows we have a real good thing in the flood-prevention program on Chambers Creek," adds County Judge Milton Hartsfield. "Public money spent on that project is a sound investment."

Reaching the 100 mark has not been easy. Local sponsors do not acquire 742 easements, permits, and rights-of-way without hard work. But they think it's worth it . . . that's why they are working so hard to build the remaining 50 dams in the project. ♦

Vegetation

Use and proper management of vegetation is basic to sustained profitable use of the 448 million acres of rotation crops, pastures, orchards, and vineyards and the 485 million acres in permanent pasture and range in the United States. ♦

Terraces assure Tunisian crop

Level terraces in the Oued M'Silah subwatershed in central Tunisia had filled to capacity twice in 3 weeks without spilling a drop. The sandy soil had drunk in the welcome moisture within 48 hours after each storm.

This was a miracle in the 13-inch rainfall area of Tunisia. It had come about as a result of the soil conservation project in the Oued Marguellil watershed being carried on by the Soil Conservation Service under a contract with the Agency for International Development and the Government of Tunisia. Before this, the pelting rains on the soil always caused high runoffs.

The terraces were constructed by Tunisian laborers under SCS supervision and were designed to retain runoff from 10-year frequency storms. The total retention of 3 inches of rainfall from one storm in late September 1966 and nearly 2 inches in early October amounted to nearly two-fifths of the annual precipitation. Since then only a few showers have fallen.

Water collected by the terraces has meant the difference between some wheat and total crop failure for the farmers. A 10 to 20 percent crop is assured on the terraced land. Plants between the terraces and on unterraced land have died from thirst.

The terraces are on 900 acres of the 4,270-acre Oued M'Silah subwatershed of the Oued Marguellil Watershed Project.

As many as 600 laborers were employed at one time, receiving a daily wage equivalent to $0.55 in cash and $0.15 in semolina, a wheat product.—Louis A. Parton, *soil conservationist, and Henry Gembala, engineer, SCS, Tunisia.* ♦

Outdoor laboratory adds real life to study of biological science

"I don't think that I could ever teach biology again without an outdoor laboratory."

Robert C. Mills was speaking. He is a biology instructor at the Putney School, Putney, Vt. He has a big outdoor laboratory now—1,000 acres—and it's all part of the grounds of the private school founded in 1935 by Mrs. Carmelita Hinton.

"When I was a biology student in high chool," Mills continued, "we studied only bottled specimens. I never knew they actually ever lived anywhere."

"The outdoor laboratory kind of introduction to biology gives students a much broader background than the more traditional indoor, preserved specimen, text-oriented type of course. While a dead specimen in a classroom has its uses, we do not believe that this is the place to begin.

"Biology is the study of life. Ultimately this means the whole organism in its environment. Only for special reasons of convenience and detailed study should it be otherwise. Field study has an integrity that fosters an attitude that we believe important and basic to the study of biology."

Henry Benson Rockwell, director of the Putney School, and Tyree Minton, a biology instructor, share Mills' enthusiam over the outdoor lab.

"Establishing an outdoor laboratory is one of the best things I've ever done for this school," Rockwell said.

According to plan

When it was decided to create an outdoor laboratory in 1955, the school became a cooperator with the Windham County Soil and Water Conservation District. As a district cooperator, the school received the help of the Soil Conservation Service in drawing up a conservation plan that would make the outdoor lab most useful and effective.

The aim of Mills and Minton is to keep the outdoor lab in a natural state so far as practical. Man's manipulation has been confined to building a few simple dams and bridges across brooks and slashing out trails through brush and woodland.

In the woodlands the biology students learn many things by observation. For example, they acquire knowledge about the growth, survival, form, and age of the trees. As part of their study, they learn that the growth rate of each tree species is related to climate, rainfall, and soil type.

"They learn that certain soils are best for certain species of trees," Mills explained.

The students study the relation of the woods to wildlife. They learn how woodlands provide food and shelter for animals. They even help nature provide for wildlife by piling up tree trimmings to make shelters. They observe that deer sometimes damage trees by chewing off the bark. The effects of woodchucks and mice are also noted.

From a pond the students collect live specimens for study. Included are water boatmen, daphnia,

A jar of algae collected from the pond holds the attention of Biology Instructor Robert C. Mills and Students Carol Quiglass (left) and Cathy Stasik.

Students file along the trail to the pond in Putney School's outdoor laboratory.

cyclops, whirlygigs or water beetles, diving beetles, algae, and several forms of microscopic life.

"We used to buy our specimens, but now we get most of them on the premises," Ty Minton said.

At regular intervals the students check the temperature, oxygen content, pH, and bacterial count of the pond water.

One part of the outdoor lab that the students find especially fascinating is a swamp.

"They discover that the swamp is a whole interesting world in itself," Mills said. "In the swamp they learn about changes in habitat. They identify and study the wildlife—all the organisms that live in the swamp. Birds, beetles, various plants, frogs, mosquitoes, and muskrats—all these come under the scrutiny of and microscopic examination by the students.

"A swamp in natural succession becomes a woodland, and the students really get wrapped up in their search for evidence of change."

Other changes in the ecology of the 1,000 acres form an interesting and continuing study. For example, the students are watching and recording the sequence from plowed land to climax forest.

An abandoned pasture yields a similar study as the students observe the change from successional to climax vegetation under favorable conditions. Vegetation in the old pasture now includes juniper, steeplebush, meadowsweet, and goldenrod.

Wildlife that the one-time pasture offers for study includes deer mice, moles, voles, jumping mice, and shrews.

A natural stand of hemlock, forming a sort of island in the 1,000-acre laboratory, provides another intriguing area for study. Because of the dense canopy of branches, it is an ideal place to see the effects of shade on undergrowth and wildlife. One of the few kinds of wildlife they find in the stand is the red squirrel.

In all their outdoor studies the students relate soil types to the vegetation and wildlife.

"From data supplied by the Soil Conservation Service we are increasing the understanding of our soils," Mills said. "When the outdoor lab was first authorized, a soil scientist from SCS classified all our fields on the basis of soil types. That has been a great help. Other SCS technicians surveyed our needs and helped us to develop an overall conservation plan for the laboratory."

Biology is not a required course at the Putney School, but most of the students take it before graduating. ♦

"Soil and America's future" SCSA topic

"Soil and America's Future" will be the theme of the 22d annual meeting of the Soil Conservation Society of America to be held in Des Moines, Iowa, August 13 to 16.

More than 1,000 professional conservationists from the United States and Canada are expected to attend.

The general session will focus on world population problems and environmental factors that influence food production. Use of soil and water resources by the public and the role of soil resources in the United States in meeting domestic and world needs will also be considered. ♦

Soil survey for planning body guides zoning and building

By Harry M. Major and Robert E. Fox
Assistant State conservationist and assistant State soil scientist, SCS, Madison, Wis.

A crew of 15 soil scientists working in a 7-county area in southeastern Wisconsin mapped more than a million acres in less than 4 years to provide information for the Southeastern Wisconsin Regional Planning Commission and citizens of the area.

With fieldwork completed in the fall of 1965, an interim report, "Soils in Southeastern Wisconsin," was prepared for the planning commission to serve until five standard soil survey publications for the area could be completed by the Soil Conservation Service.

Information available at once

While the survey was in progress, the planning commission received halftone negatives of each field sheet as it was completed. These were reproduced and made available, along with interpretive tables, to people needing information about the soils of specific areas.

The interim report contains descriptions of all the soils mapped, totaling more than a hundred series involving about 1,500 field mapping units. In addition there are some 100 different kinds of interpretation of the meaning of the soil facts in terms of suitability for various uses.

For each mapping unit, interpretations were made for 6 specific engineering uses; 7 items pertaining to road construction; 12 items concerning water management; and 8 kinds of farm and nonfarm uses.

Agricultural interpretations tell the suitability and limitations of the soils for cultivated crops and woodland, their needs for irrigation and drainage, and their potential yields of crops and woodland products. The report also includes guides to the use of plant materials for beautification and soil stabilization, and the use of soils for recreational development for wildlife.

A soil limitations rating of "slight," "moderate," "severe," or "very severe" was assigned to each mapping unit, item by item, and the principal factors affecting the rating were listed.

Throughout the progress of the survey, the planning commission was putting soils information on IBM cards for future reference. It was making soil maps directly from the field sheets for various soil uses, such as transportation systems, residential development with and without public sewage disposal systems, industrial development, and park and open space areas.

The planning commission is promoting the use of soil surveys as a basis for zoning laws and as a basis for detailed planning by cities, towns, and individuals. It contributed $130,000 toward the cost of the survey.

A demonstration farm

The University of Wisconsin Extension Service is using the County Farm in Waukesha County to demonstrate the relationship between soil properties and soil interpretations. Pits have been dug in the principal soils of the farm and interpretive maps drawn for several uses. An interested po-

An SCS soil scientist, Augustine Otter, takes a slope reading as part of the soil survey in a suburban area.

tential user of soil surveys can learn from these demonstrations the value of knowing the different kinds of soils and their limitations for various uses.

The benefits already derived from the southeastern Wisconsin soil survey have far surpassed the most optimistic early estimates. In the period April 1964 to January 30, 1966, the regional planning commission serviced 298 requests for soil survey information. Clients included private citizens; city, town, village, county, and State governments; consultants, realtors, engineers, builders, surveyors, and planning commissions.

In Washington County a proposed residential development was rejected by the board of health because soil limitations were "severe" and "very severe" for on-site sewage disposal systems. Failure to refer to soil surveys resulted in a loss to developers for construction of the streets, but later use of soils information saved potential home purchasers $1,440,000.

In Kenosha County, a motel builder turned to soil surveys for aid in selection of a suitable site for a $1 million investment. The town of Bristol, in the same county, based its entire comprehensive plan on the soil survey.

Some estimated savings

William J. Kockelman, chief community assistance planner of the regional planning commission, compiled the following list of savings resulting from uses of soil surveys:

	Savings Dollars
Three townships, zoning	22,000
Three townships, comprehensive plan	30,000
The town of West Bend, building regulations	5,000
The city of Franklin, subdivision regulations	10,000
The city of Milwaukee, location of one industrial plant site	5,000
The village of Pewaukee, parks and open space planning	2,000
Total	74,000

Kurt W. Bauer, executive director of the Southeastern Wisconsin Regional Planning Commission, has estimated projected benefits in the next 20 years of $300 million on housing alone in the southeastern Wisconsin region. He estimates that without adequate soils information 150,000 homes in the region would be built on unsuitable soils. The excess cost to the public for disposal fields and sewerlines on the unsuitable sites is estimated at $2,000 a home.

"We have just begun to realize the value of using the soil survey for comprehensive planning," Mr. Bauer says. "The figures that we have provided are only the beginning of the savings that can be made through the use of this information for the location of housing, highways, disposal plants, recreational developments, and other types of development that the public will need." ♦

Most Western streams have near-normal flow

Water supplies are adequate for irrigation and power along most Western mountain streams this season, according to a report prepared by the Snow Survey and Water Supply Forecasting Unit of the Soil Conservation Service at Portland, Oreg.

Less than average flows were expected only in the southern Rocky Mountains and adjacent areas of southern Utah and Arizona. Water shortages are most severe on the Arkansas and Rio Grande.

A cool April that increased the already heavy snowpack and delayed snowmelt tended to concentrate streamflow into a shorter period than usual in the Upper Columbia and Upper Missouri basins and from the Sierras of California.

The report indicated that May to September flows of the upper Missouri and main Yellowstone rivers and their tributaries would range near 150 percent of average, two to three times that of last year. ♦

First national water assessment

The first National Water Assessment, being prepared under requirements of the Water Resources Planning Act of 1965, will present a general appraisal of the adequacy of the Nation's water supplies on the basis of existing data.

Under the Act, new assessments will be made every 2 years under the direction of the National Water Resources Council.

The Department of Agriculture participates in all activities of the council. The Soil Conservation Service has leadership within the Department for water resource programs and is contributing to the 1967 assessment.

SCS has leadership for preparing chapters on watershed land management and on land drainage for the section on water utilization and management. It is contributing to most of the separate chapters on the 20 water-resource regions and has leadership for the Souris-Red-Rainy regional chapter.

In addition to defining present and future problems related to the quantity and quality of water, the national assessment studies are to identify flood and drought problems; identify institutional and organizational problems in the development and management of water and related land resources; provide an inventory of water and related land-resource plans, projects, and investment schedules; provide a report of current and projected use of resources and economic activity in each region; and provide a basis for testing the probable consequences of alternative water policies.

It is expected that future reports will be based on more detailed analyses, using data and information compiled in the comprehensive river basin framework (type I) studies scheduled for completion in all water-resource regions by 1972. ♦

USDA's conservation policies

Secretary of Agriculture Orville L. Freeman presented to President Johnson the first printed copy of the revised and updated conservation policies of the U.S. Department of Agriculture, a booklet entititled, "Resources in Action —Agriculture/2,000."

"The Department's work," he said, "involves help not only to the owners of the three-fourths of our land that is privately held but also the multiple-use management of the 197 million acres of publicly held land in the National Forests and National Grasslands.

"In the light of your call for creative conservation," Secretary Freeman reported to the President," the Department has thoroughly reviewed its conservation policies and goals.

"This document seeks to set down in sharp outline new conservation policies and the path to their implementation to which each of the diverse agencies that make up the U.S. Department of Agriculture is dedicated."

Secretary Freeman said that the Department's goal is to "help enhance man's total environment—a unified approach rather than one dealing piecemeal with one resource, or one use, or one purpose at a time." ♦

Planning is basic need in suburbia

Planning—from communities to regions and river basins—to bring about the fullest conservation use of the Nation's resources was the key most often mentioned in the 2-day exchange of ideas at the Soil, Water, and Suburbia Conference in USDA's Jefferson Auditorium in Washington.

Planners, architects, public officials, engineers, contractors, investors, along with several able and articulate citizens, responded to the joint invitation of the Department of Agriculture and Department of Housing and Urban Development to discuss problems of urban growth.

The chairman of the Board of County Commissioners of Multnomah County, Oreg., summed the matter up this way: "The problems of suburbia need careful management, detailed knowledge, and a willingness to work together by all who are involved."

A citizen who has been contending with local problems in the Washington metropolitan area as chairman of the engineering committee of the Lake Barcroft Community Association, Stuart Finley, emphasized the citizen's dependence on his local government.

"To be effective," Finley, a Virginia resident, asserted, "a citizen's association should have a community of interest, leadership, an active multifaceted program, and an energetic communication with its members. This is feasible. It is surprising what remarkable talents you can find within your community if you just look."

The executive director of the Southeastern Wisconsin Regional Planning Commission, Kurt W. Bauer of Waukesha, Wis., declared that, "intergovernmental planning on a comprehensive, areawide basis is essential—but not sufficient—to sound resource protection and use, and to any meaningful guidance of rural and urban development in the public interest today."

An engineering consultant, William W. Moore of San Francisco, and Dr. Charles E. Kellogg, SCS deputy administrator for soil survey, agreed that building can be done on almost any site—if the builder is willing to foot the bill.

"However," Mr. Moore pointed out, "the cost and risk of doing this varies greatly. The economic factors must be considered, not only in terms of the initial dollar cost of construction, but in the cost of upkeep, the cost of using up natural resources, the effect on recreational facilities, and other social and psychological factors."

Dr. Kellogg, describing the wide variation in soil characteristics, said. "Either by selecting an unsuitable soil for a fixed use, or by selecting an unsuitable use for a specific soil, the risk of loss can be very high."

SCS Administrator Donald A. Williams reminded his listeners that "the history of soil and water conservation in this country has been one of mutual effort based on local initiative and leadership. It has been aimed at local problems and local needs . . . It is not necessary to write a whole new conservation program for suburban areas. The principles of sound soil and water conservation are the same wherever they may be applied."

Mr. Williams added that the Nation's soil and water conservation districts are a ready source of help in planning. ♦

Un sejour en Algerie

(Continued from p. 8)

planted on the terrace berms to assure contour operations. Waterways would be stabilized with stone structures to a zero grade, and trees would be planted on land too steep and gullied for pasture or crops.

The mayor insisted that something be done to improve the water systems for the three towns. So, it was agreed to build two small reservoirs, one each for Bou Assem and Tazbit; build extra water fountains; and equip all fountains with spigots. Merely storing water normally wasted during periods of nonuse would make about three times more water available during the day. There would be a watering trough near each reservoir so the livestock could use the overflow. Bou Assem's water supply was three small springs, and the collection systems at all three were to receive major repairs.

At Hausonvillers, an abandoned spring development, pipeline, and reservoir would be repaired and put back into operation to augment the main water system. A dam that would impound 15 acre-feet of water was planned for domestic and livestock use. The watershed of the impoundment would be terraced and the waterways stabilized.

At last work begins

By the first of March 1965 administrative and organizational problems at the national level were cleared sufficiently to permit a few projects to start. Detailed plans and field layouts were ready. By this time everyone in the area seemed to know all about the project, and when the mayor asked for 150 men on a Monday morning to start the work, nearly 300 showed up. It was agreed, in the interest of harmony at the moment, to add an additional 100 next Monday, making a total of 250 men on the project.

So, early in March 250 men began work—some on the waterways; some digging terraces with picks and shovels; some on spring development; some on the reservoirs; and others gathering or quarrying stone for structures.

The only machinery in use were the trucks to haul tools, cement, and stone.

Fehreni Abdenour, *sous-prefet*, came and turned "a first spadeful of earth" to officially open the project. He then made a short speech expressing keen interest in the program and promised complete support. He displayed concern over the soil conservation and water development needs of the Kabylie.

Abdenour was a former school teacher, and he knew the value of teaching by example. As a political leader he knew well the problems associated with unemployment. As a concerned citizen, he frankly pointed out that something had to be done to stop the rapid destruction of soil resources. To Abdenour, this project and the others to follow were steps, small though they were, in the right direction.

The Algerian Forestry Service asked us to restore to production a tree nursery destroyed and abandoned during the revolution. This project was opened, a few days after the Hausonvillers project, with 40 workmen. A few more than 100,000 eucalyptus trees were grown and ready for field planting by November.

Additional projects

About the first of July the go-ahead was given to start additional projects. Nine more erosion-control projects, similar to the Hausonvillers project, and six tree planting projects on public land were started. In all there were 17 "Food for Work" projects employing 3,300 men in the Grand Kabylie by the end of the year. Plans were completed on 12 additional projects that could have employed another 3,000 men.

Work progressed well for the rest of the season. The Hausonvillers project was expanded from about 250 acres to more than 1,000 acres. On several occasions farmers inquired if they could get their land included in the "project." To us, this was a healthy sign.

Rains during the first winter put the terraces and waterways to a real test. Only minor damage resulted on a few new terraces during a storm that yielded between 5 and 6 inches of rainfall in a 24-hour period.

Perhaps the most spectacular accomplishment on any of the projects in the Kabylie was the water-supply dam at Hausonvillers. Ninety men built a 5,500 cubic meter earth dam with picks, shovels, hand tampers, and 30 wheelbarrows.

It was never intended to construct the dam with so few wheelbarrows, but that is the way it worked out. Everything was ready to begin construction—but no wheelbarrows. "They would be along shortly"—and rather than delay work, 30 wheelbarrows were purchased locally. Twenty were put on the dam at Hausonvillers and 10 on a smaller dam on the

project at Les Ouadhais. Later, 10 additional wheelbarrows were added at Hausonvillers.

The fill material was compacted with hand tampers. Water was hauled to keep the moisture content optimum for compaction. The upstream face of the dam was riprapped for protection against wave erosion and because heavy drawdown was expected during the dry season. The emergency spillway was cut through solid stone with hand drills, hammers, chisels, and wedges. Construction was completed in early July 1965—and then 250 wheelbarrows arrived!

At first French and Algerian technicians seemed a bit skeptical that technicians from the United States, the land of mechanization, were planning to construct terraces and earth dams using hand labor. At times, early in the program, we felt their cooperation was polite tolerance. Later, when it become evident that real and tangible results were coming from the whole approach, the attitude of the technicians at the local level seemed to change.

After the program was well underway in the Kabylie, the *prefet, sous-prefet* Abdenour, and Mr. Lamari, chief of the Forestry Service in Tizi Ouzou, with whom we worked very closely, all were transferred to new positions. It is significant to note that the replacements for these men—all key men as far as we were concerned—gave equally as good cooperation.

The *prefet*, the *sous-prefets*, and the mayors liked the program because it furnished employment and tackled acute soil erosion problems. Throughout the tour we found these officials cooperative. This was an action program that produced results. Others came with promises of help, but as one official put it, "it's just so much talk."

All in all, we were well received in the Kabylie of Algeria, and even by the most modest assessment, the cooperation was good. ♦

Attracting Birds: From the Prairies to the Atlantic. By Verne E. Davison. *1967. Thomas Y. Crowell Co., New York. 252 pp., illus. $6.95.*

Thirty years of painstaking observation of birds and bird feeding, coupled with a like span of experience in wildlife habitat management as a biologist of the Soil Conservation Service, prepared Verne E. Davison to write a thoroughly unique and original book on a much-worked subject of wide interest.

At his own home in Alabama and in Georgia, and at many study points in the Southeastern and Central States, Davison "tested" the preference of birds for different kinds of foods by exposing samples under comparable conditions and noting which ones different species chose or rejected.

The results of his own observations combined with information from more formal "food habits" research (mainly by the Fish and Wildlife Service, formerly the Biological Survey) clearly indicated that different kinds of birds do prefer different kinds of food.

In this book, he rates some 700 plants as "choice," "fair," or "unimportant" as foods for 400 species of birds. Alphabetical listings of both birds and plants enable the user to find and compare information for species of particular interest to him.

Davison's studies and experience have convinced him that "food is by far the most significant influence in a bird's life." Second in importance are suitable nesting sites. The book includes a chapter on the nesting requirements of birds, with suggestions for providing suitable plant cover and specifications for nesting boxes.

The book is a demonstration of the practical application of detailed knowledge to wildlife management problems that is the stock-in-trade of conservation biologists. It is the summation of the fruits of one man's lifelong devotion to a special interest, for which countless homeowners and others with an interest in birds will be grateful.—B. O.

Plant Environment and Efficient Water Use. Edited by W. H. Pierre, Don Kirkham, John Pesek, and Robert Shaw. *(1966). Amer. Soc. Agron. and Soil Sci. Soc. Amer., Madison, Wis. 295 pp., illus. $6.00.*

This 13-chapter publication is a comprehensive review of significant research information on the role of water in American agriculture and ways of achieving more efficient use of it in crop production. It presents the papers that were given at a symposium held in 1965 on the subject. The authors are recognized leaders in the field of research on all aspects of water, plant, and soil relationships.

The first two chapters consist of general information on the water problem and its perspective in agriculture. Both include many good examples of the amounts used by various users and the variations in rainfall on a transect from Akron, Ohio, to Cheyenne, Wyo.

Seven chapters deal with basic information on such subjects as evapotranspiration, root evironment, fertility, production, and water movement in the soil.

Three chapters discuss the principles of water management and increasing the efficiency of water use through improved soil and crop management practices. All three contain recent research results on reduction of water losses by various conservation measures, such as tillage, planting techniques, irrigation water management, and other proved practices.

This publication contains a wealth of information that can be

used by many people, those interested in agriculture as well as those who have other interests in the role of water for other uses.—B. D. BLAKELY, *head agronomist, SCS.*

New publications

Outdoor Recreation Trends. BY U. S. BUREAU OF OUTDOOR RECREATION. *1967. U.S. Dept. Int. 24 pp., illus. $0.40.* A graphic representation of trends in summer outdoor recreation activity, comparing data obtained in 1965 by the Bureau of Outdoor Recreation with those for 1960 published in the report of the Outdoor Recreation Resources Review Commission.

The 5-year comparisons prompt the BOR to project a fourfold increase in recreation activity by the year 2000, compared to a threefold increase projected by ORRRC.

The five most popular activities in 1965 were, in order, walking for pleasure, swimming, driving, games and sports, and bicycling. ORRRC reported the order in 1960 as driving, swimming, walking, games and sports, and sightseeing.

Know the Soil You Build on. BY A. A. KLINGEBIEL. *1967. USDA Agr. Inf. Bul. 320. 14 pp., illus.* Effectively illustrated, this bulletin alerts the prospective home buyer or builder to avoid poor soil-site pitfalls and gives clues on what to look for. It presents information on the ideal soil for most uses, provides concrete examples of homes destroyed or damaged because they were built on bad soil sites, and recommends the use of soil surveys before going ahead with building or buying homes.

Resources in Action—Agriculture/2000. *1967. USDA. 19 pp., illus.* An official statement of the Department's conservation policies. See story on page 19, and the Administrator's statement in the July issue of *Soil Conservation.*

The Third Wave. *1967. U.S. Dept. Int. Conservation Yearbook No. 3. 128 pp., illus. $2.00.* The third yearbook of the Department of the Interior in the profusely illustrated (with color) format initiated in 1965.

An Economic Survey of the Northern Lake States. BY R. A. LOOMIS AND M. E. WIRTH. *1967. USDA Agr. Econ. Rpt. 108. 132 pp., maps, charts.*

The 1964-65 Cropland Conversion Program: A description and appraisal. BY JAMES VERMEER. *1967. USDA. Agr. Econ. Rpt. 111. 39 pp.*

Soil surveys

Jersey County, Illinois. REPORT BY J. B. FEHRENBACHER, UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION, AND C. E. DOWNEY, SOIL CONSERVATION SERVICE. *1966. 80 pp., illus.; maps 3.17 inches to the mile (1:20,000).* Fieldwork by J. B. Fehrenbacher, A. H. Beavers, R. B. Grossman, and P. R. Johnson, University of Illinois Agricultural Experiment Station, and F. L. Awalt, F. W. Cleveland, C. E. Downey; C. C. Miles, L. L. Miller, Richard Rehner, and B. J. Weiss, Soil Conservation Service.

Tucker County, Part of Northern Randolph County, West Virginia. BY CRAIG K. LOSCHE, FOREST SERVICE, AND W. W. BEVERAGE, SOIL CONSERVATION SERVICE. *1967. 78 pp., illus.; maps 3.17 inches to the mile (1:20,000).* Soils surveyed by Craig K. Losche, Robert W. Douglass, James C. Byrne, Charles R. Gass, Albert F. Ike, Jr., Forest Service, and W. W. Beverage and John W. Warner, Jr., Soil Conservation Service.

Arenace County, Michigan. BY C. E. REDMOND AND C. A. ENGBERG *1967. 142 pp., illus., maps 3.17 inches to the mile (1:20,000).* Fieldwork by W. H. Colburn, Michigan Department of Conservation, and E. P. Whiteside, Karl Pregitzer, Sidney Pollack, and B. L. Allen, Michigan Agricultural Experiment Station.

Beaver Creek Area, Arizona. BY JOHN A. WILLIAMS AND TRUMAN C. ANDERSON, JR., FOREST SERVICE. *75 pp., illus.; maps 2 inches to the mile (1:31,680).* Soils surveyed by Truman C. Anderson, Jr., Andrew A. Leven, John A. Williams, Darwin B. Crezee, and Wesley E. Suhr, Forest Service.

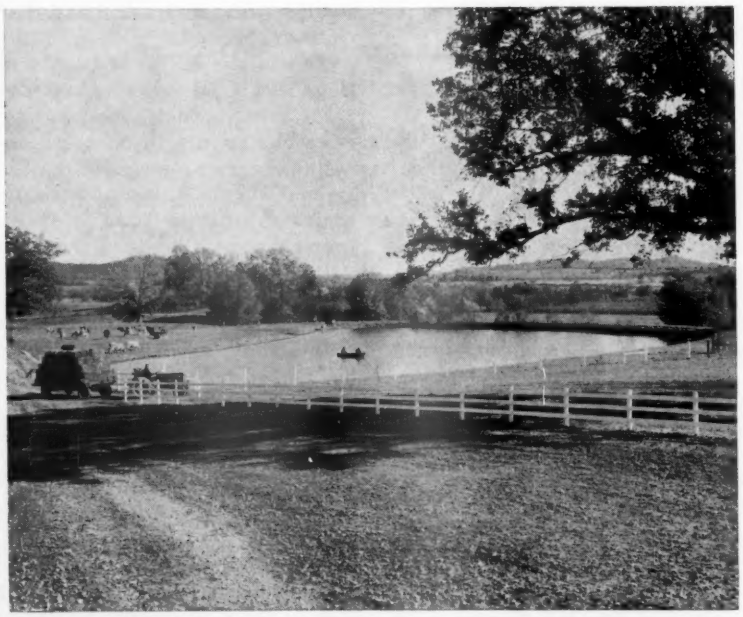
Columbia County, Pennsylvania. BY PAUL H. PARRISH. *1967. 139 pp., illus.; maps 3.17 inches to the mile (1:20,000).* Soils surveyed by Paul H. Parrish, Warwick M. Tinsley, Robert P. Zimmerman, Robert K. Craver, Robert Cruikshank, and W. R. Byrne.

Tate County, Mississippi. REPORT BY JERRY S. HUDDLESTON. *1967. 85 pp., illus.; maps 4 inches to the mile (1:15,840).* Soil surveyed by R. C. Carter, H. S. Galberry, Jerry S. Huddleston, A. E. Thomas, and W. L. Watts.

Chicot County, Arkansas. BY HARDY CLOUTIER AND CHARLES J. FINGER. *1967. 58 pp., illus.; maps 3.17 inches to the mile (1:20,000).* Field survey by Hardy Cloutier, Fred C. Larance, and H. Wade Long.

Greer County, Oklahoma. BY JIMMIE W. FRIE, R. C. BRINLEE, AND RICHARD D. GRAFT. *1967. 72 pp., illus. maps 3.17 inches to the mile (1:20,000).*

AMERICA THE BEAUTIFUL COLOR LITHOGRAPHS



America The Beautiful—Tennessee USDA SOIL CONSERVATION SERVICE
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From the Administrator:

Soil, Water, and Food for Peace

While we may regard the physical needs of man as being on a lower level than social or personal values, they are supremely important if they cannot be provided. In reality, man lives for bread alone—*when there is no bread.*

We in America are blessed with an abundance of food, but for most of the world today the basic physical need for food, water, and shelter is predominant. When there is lack of food, people are restless. They fight to stay alive. They create an unstable society in which there can be no peace.

Four years ago the Food and Agriculture Organization of the United Nations sponsored a great World Food Congress. The target of that meeting was to find ways and means of providing an adequate, nutritious diet for every man, woman, and child in the world. It was concluded at that time that the technology and know-how exist to make it possible to produce the needed food and fiber.

In May of this year another great international meeting was held on Water for Peace. We stated then that water is essential for economic stability, agricultural sufficiency, and for prosperity and progress. That conference, too, signified a faith in victory over starvation and want.

We have long known that soil and water are inseparable. Secretary Freeman stated at the Water for Peace Conference that water resources and land resources cannot be isolated from each other. They are the basic factors in food production.

Soil, water, and food, therefore, become the key elements in our striving for world peace.

Millions of acres of potentially good cropland throughout the world are eroded, waterlogged, seriously damaged by floods or salinity, deficient in required nutrients, or parched beyond significant agricultural value. These lands can be made productive as, indeed, many of them once were. They can contribute to alleviating the hunger that stalks so much of the earth.

To that end, the Soil Conservation Service is engaged in a program of technical assistance to the developing countries. Over a period of more than 30 years, we have developed in this country a cadre of skilled scientists and technologists trained in every discipline that can help to diagnose land and water problems and prescribe successful treatment and use. We are sharing the knowledge and skills of these experienced experts with countries where increased food production is essential to win what President Johnson has described as the "race with disaster."

My visits to Turkey, India, Thailand, Viet Nam, Brazil, and other countries have impressed me with the importance of accelerating progressive agricultural practices in the developing nations.

During the past 4 years, SCS has provided technical assistance and training to 20 countries under Participating Agency Service Agreements in cooperation with the Agency for International Development. Before this arrangement was devised, which enables SCS people to serve in foreign lands under the continuing direction of our own organization, SCS had, for some 25 years or more, contributed to international programs by placing our technicians on loan to AID and its predecessor agencies.

At the close of the 1967 fiscal year, the Service had 28 specialists in various aspects of soil and water conservation working in eight countries. We anticipate that by the end of fiscal year 1969, we will have 60 people working in 12 countries.

This assistance is directed primarily to giving advice and counsel in the field of soil and water management. In addition, SCS has also been providing training opportunities in the United States for technicians from other countries. Several thousand of these people have studied our techniques and procedures. Many of them are now in positions of responsibility in their countries and are the key people with whom our overseas personnel are working.

Technological development is a gradual, long-term process that demands patience and diligence from all participants. In every case, we must begin by understanding the nature of the land—the soil, the landscape, the water supply—and the nature of the people—their culture and their technological experience.

Once the basic food needs of the world are met, the chances for peace and prosperity for all people are improved. We recognize that this cannot be accomplished without the dedicated interest of our people who accept overseas assignments.

Our fine staff now in foreign lands is demonstrating that people everywhere will work to help themselves if given the encouragement, the hope, and the know-how to get things done.

D. A. Williams

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The Crider Memorial Garden of conservation plants

The Crider Memorial Garden at the National Plant Materials Center, Beltsville, Md., was dedicated July 7 to honor Dr. F. J. Crider and all who have helped in the search for improved plants to fit the requirements of conservation problems.

The garden contains more than 200 samples of conservation plant materials selected through the observational program now carried on in 20 SCS plant materials centers that span the continental United States and extend to Hawaii and Puerto Rico. Additional species and strains used extensively in conservation work are also included.

Dr. Crider was director of the Boyce-Thompson Institute's Arizona station before he started his Federal career in soil conservation work as regional leader of nursery activities in the Southwest region in 1934. With his transfer to Washington, D. C., in 1935, he became head of conservation nurseries for SCS. In 1938 he took charge of the National Observational Nursery Project at Beltsville, Md.

In 1951, when he retired, he received the U. S. Department of Agriculture's Superior Service Award "For his leadership in developing and carrying out nursery observational studies....."

Combined efforts of SCS technicians and research workers of other agencies have increased the effectiveness and intensity of the program initiated by Dr. Crider nearly 30 years ago. ♦